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| APPLICATION NO.                                   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/709,465  | 05/07/2004  | Hong-Da LIU          | DISP0005USA         | 3464             |
| 27765   | 7590        | 08/05/2005           | EXAMINER            |                  |
| NORTH AMERICA INTERNATIONAL PATENT OFFICE (NAIPC) |             |                      | CHIEN, LUCY P       |                  |
| P.O. BOX 506                                      |             |                      | ART UNIT            |                  |
| MERRIFIELD, VA 22116                              |             |                      | PAPER NUMBER        |                  |
|   |             |                      | 2871                |                  |

DATE MAILED: 08/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/709,465             | LIU, HONG-DA        |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Lucy P. Chien          | 2871                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claim 1-6** are rejected under 35 U.S.C. 102(e) as being anticipated by Liao et al (US 20020163610).

#### *Regarding Claim 1.*

Liao et al discloses Fig. 10a (top arrangements of pixel) the LCD comprising a substrate having a plurality of pixels arranged in arrays, each pixel corresponding to a liquid crystal cell. Fig. 13A (same embodiment) discloses forming a bump (1015) on at least a side of each pixel for controlling inclined directions of liquid crystal molecules (shown between the two substrates) of each liquid crystal cell, and forming a concave (1013) in each pixel of the substrate for fixing a position of a reverse domain due to the different inclined directions of the liquid crystal molecules in each liquid crystal cell.

#### *Regarding Claim 2.*

Liao et al discloses (Page 4, [0051]) liquid crystal cell is a liquid crystal cell of an LCOS.

#### *Regarding Claim 3.*

Art Unit: 2871

Liao et al discloses (Page 4, [0041],[0049], [0053]) the liquid crystal cell is driven by methods comprising dot inversion, frame inversion.

Regarding Claim 4,

Liao et al discloses the liquid crystal cell comprises of a twisted nematic.

Regarding Claim 5,

Liao et al discloses Fig. 13A where the bump (1025) is positioned on two opposite sides of each pixel, and the concave (1013) is positioned halfway between the bumps in each pixel.

Regarding Claim 6,

Liao et al discloses Fig. 13A each bump (1025) is positioned around each pixel, and each concave (1013) is positioned at a symmetrical center of an area encompassed by the bump.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claim 7-10,28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Liao et al (US 20020163610) in view of Matsumoto (US 6624866).

Regarding Claim 7,

Liao et al does not disclose the substrate having a bottom layer forming an electrode layer on the bottom layer.

Liao et al does disclose in the prior art (Figure 5B) a frame-plus-bias inversion method, which is applied to the display.

Matsumoto discloses in Figure 9 the substrate (9) having a bottom layer (18) a further forming an electrode layer (2) on the bottom layer.

It would have been obvious to one skilled in the art to modify Liao et al's display to include Matsumoto's bottom layer and electrode layer to attain a wide viewing angle. (Matsumoto, Column 1, Row 20-25)

Regarding Claim 8,

In addition to Liao et al and Matsumoto disclosed above, Matsumoto further discloses (Figure 9) an electrode (2) being positioned underneath the bump (8) and corresponding to the bump.

Regarding Claim 9,

In addition to Liao et al and Matsumoto disclosed above, Matsumoto further discloses (Figure 9) a first substrate (9) having a bottom layer (18) there under and a pixel defined thereon (2).

Liao et al discloses Figure 13A) liquid crystal molecules positioned above (molecules between both substrates as shown) the first substrate (under bump) at least

Art Unit: 2871

a bump (1015) positioned on at least two opposite sides of the pixel of the first substrate for controlling inclined directions of the liquid crystal molecules, a concave (1013) positioned in the pixel of the first substrate for fixing a position of a reverse domain due to the different inclined directions of the liquid crystal molecules above the concave (1013), and a second substrate (located above the liquid crystal molecules) positioned above the liquid crystal cell.

Regarding Claim 10,

In addition to Liao et al and Matsumoto disclosed above, Liao et al further discloses (Page 4, [0051]) a liquid crystal cell of LCOS.

Regarding Claim 28,

In addition to Liao et al and Matsumoto disclosed above, Liao et al discloses the heights of protrusions can be at least  $1/5$  of cell gap  $H$  that is in the ranges from  $1/50$  to  $1/3$ . (Page 6, [0073]).

**Claim 11-14,16-22** are rejected under 35 U.S.C. 103(a) as being unpatentable over Liao et al (US 20020163610) and of Matsumoto (US 6624866) in view of Yaniv (US 5905557).

Regarding Claim 11,

Liao et al and Matsumoto do not teach the bump to be an insulating material. Yaniv teaches the use of insulating spacers to provide electrical isolation. (column 4, row 20-24)

Art Unit: 2871

It would have been obvious to one skilled in the art to modify Liao et al's display and Matsumoto's bottom layer and electrode layer to include Yaniv's insulating spacers to provide electrical isolation. (Yaniv, column 4, row 20-24)

Regarding Claim 12.

In addition to Liao et al, Matsumoto and Yaniv as disclosed above, Yaniv further discloses (Column 4, Row 30-35) the insulating material made of silicon oxide, silicon nitride, and inorganic materials.

Regarding Claim 13.

In addition to Liao et al, Matsumoto and Yaniv as disclosed above, Liao et al discloses (Page 4, [0041],[0049], [0053]) the liquid crystal cell is driven by methods comprising dot inversion, frame inversion.

Regarding Claim 14.

In addition to Liao et al, Matsumoto and Yaniv as disclosed above, Liao et al discloses the liquid crystal cell comprises of a twisted nematic. (Page 1, [0009])

Regarding Claim 16.

In addition to Liao et al, Matsumoto and Yaniv as disclosed above, Liao et al discloses (Figure 13A) a bar shaped bump.

Regarding Claim 17.

In addition to Liao et al, Matsumoto and Yaniv as disclosed above, Liao et al discloses (Figure 13A) a bump is circular.

Regarding Claim 18.

Art Unit: 2871

In addition to Liao et al, Matsumoto and Yaniv as disclosed above, Liao et al discloses (Figure 13A) the concave is bar shaped.

Regarding Claim 19,

In addition to Liao et al, Matsumoto and Yaniv as disclosed above, Liao et al discloses (Figure 13A) where the liquid crystal molecules incline from the bump toward the concave.

Regarding Claim 20,

In addition to Liao et al, Matsumoto and Yaniv as disclosed above, Liao et al discloses (Figure 13A) where the concave fixes a position generated due to contrary inclined directions of the liquid crystal molecules close to the concave.

Regarding Claim 21,22,

In addition to Liao et al, Matsumoto and Yaniv as disclosed above, Matsumoto further discloses (Figure 9) the first substrate (9) has a electrode (2) positioned on the bottom layer (18) each electrode being positioned directly underneath the bump (8).

**Claim 15**, is rejected under 35 U.S.C. 103(a) as being unpatentable over Liao et al (US 20020163610) and of Matsumoto (US 6624866) in view of Yoshimi et al (US 5245456).

Liao et al and Matsumoto do not disclose the phase difference ranges from 150nm to 410nm.

Yoshimi et al discloses (Column 8, Row 58-62) the phase difference is 400 nm to attain improved visibility and recognizability. (Column 3, Row 1-5)



Art Unit: 2871

It would have been obvious to one skilled in the art to modify Liao et al's display and Matsumoto's bottom layer and electrode layer to include Yoshimi et al's phase difference range motivated to attain improved visibility and recognizability. (Yoshimi et al, Column 3, Row 1-5)

**Claim 23-25** are rejected under 35 U.S.C. 103(a) as being unpatentable over Liao et al (US 20020163610) and of Matsumoto (US 6624866) in view of Hisatake et al (US 6061110).

Regarding Claim 23.

Liao et al and Matsumoto do not disclose the bump has a height range from .3  $\mu\text{m}$  to 3.  $\mu\text{m}$ .

Hisatake et al discloses (Column 28, row 21-25) the bump having a diameter of 2.5  $\mu\text{m}$  for controlling the space between the first and the second substrates. (Column 10, Rows 8-11).

It would have been obvious to one skilled in the art to modify Liao et al's display and Matsumoto's bottom layer and electrode layer to include Hisatake et al's bump dimensions to control the space between the first and the second substrates. (Column 10, Rows 8-11).

Regarding Claim 24.

In addition to Liao et al, Matsumoto and Hisatake et al as disclosed above, Hisatake et al also discloses the bump has a diameter of 2.5  $\mu\text{m}$  which is within the width range from .3  $\mu\text{m}$  to 20  $\mu\text{m}$ .

Regarding Claim 25.

Art Unit: 2871

In addition to Liao et al, Matsumoto and Hisatake et al as disclosed above, Hisatake et al also discloses the diameter of the bump to be 2.5  $\mu\text{m}$ , thus, the height and width of the bump is 2.5  $\mu\text{m}$ . the cell gap is the height of the bump because it controls the space between the first and the second substrates. So the ratio of the height of the cell gap is 1 (shown in Figure 28).

**Claim 26-27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Liao et al (US 20020163610) and of Matsumoto (US 6624866) in view of Yamanaka et al (US 20020018161).

Regarding Claim 26,

Liao et al and Matsumoto do not disclose the concave depth, width and ratio ranges.

Yamanaka et al discloses (Page 20, [0248]) the concave has a depth range of 5  $\mu\text{m}$ , which is in a range from .05  $\mu\text{m}$  to 3  $\mu\text{m}$ , which provides an electrical connection between a pixel electrode and a switching element. (Page 2, [0015].)

It would have been obvious to one skilled in the art to modify Liao et al's display and Matsumoto's bottom layer and electrode layer to include Yamanaka et al concave depth range motivated to provide excellent electrical connection between the pixel electrode and the switching element.

Regarding Claim 27,

In addition to Liao et al, Matsumoto and Yamanaka et al disclosed above, Yamanaka et al further discloses (Page 20, [0248]) the width of the concave is 15  $\mu\text{m}$ , which is in the range of .05  $\mu\text{m}$  to 20  $\mu\text{m}$ .

Art Unit: 2871


**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lucy P. Chien whose telephone number is 571-272-8579. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571)272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lucy Chien  
Examiner  
Art Unit 2871  
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